# Technical Document

## Gallbladder Removal in Utah Health Care Facilities: Quality and Charges, 2006

**Office of Health Care Statistics**
**Health Data Committee**
**Utah Department of Health**
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# Table of Contents

# Introduction

### Mandates for Publishing Utah Health Care Consumer's Reports:

Utah Senate Bill 132, titled "Health Care Consumer's Report," passed by the 2005 Utah Legislature, requires the Health Data Committee (HDC) to report health facility performance annually for consumers. The public consumer reports shall use nationally recognized quality and patient safety standards and facility charges for conditions or procedures. In December 2005, the HDC began to publish a series of hospital comparison reports on hospital charges, quality and patient safety.

### Purpose of the Technical Documentation:

This technical documentation is one of a series of publications to provide technical information and methodological explanations on the Utah Health Care Consumer's Reports. Audience for this publication includes hospital personnel, health professionals, health data analysts and other interested professionals.

### The Health Data Committee

Chapter 33a, Title 26, Utah Code Annotated established the thirteen-member Utah Health Data Committee. In accordance with the act, the committee's purpose is—

> *"to direct a statewide effort to collect, analyze, and distribute health care data to facilitate the promotion and accessibility of quality and cost-effective health care and also to facilitate interaction among those with concern for health care issues."*

### The SB132 Health Care Consumer's Report Task Force

The Health Data Committee established the SB 132 Health Care Consumer's Report Task Force in 2005. The SB132 Task Force is a technical advisory group that provides consultation to the Utah Health Data Committee and its staff members in the Office of Health Care Statistics on measures, methods, and priorities for developing Health Care Consumer's Reports and related web reporting system.

# Data Source

### The Hospital Discharge Database

The data source for the Utah Health Care Consumer reports is the statewide hospital discharge database. Administrative Rule R428-10, titled "Health Data Authority, Hospital Inpatient Reporting Rule," mandates that all Utah licensed hospitals, both general acute care and specialty, report information on inpatient discharges. Since 1992, all hospitals have reported "discharge data" for each inpatient served. "Discharge data" means the consolidation of complete billing, medical, and demographic information describing a patient, the services received and charges billed for each inpatient hospital stay. Discharge data records are submitted to the office quarterly. The data elements are based on discharges occurring in a calendar quarter.

### Measures Used

Please note that the number of patients for each Agency for Healthcare Research and Quality (AHRQ) Inpatient Quality Indicator (IQI) may not be the same as the number of patients for similar All Patient Refined Diagnosis Related Groups (APR-DRGs). The IQIs use different inclusion and exclusion criteria than some similarly named APR-DRGs. The IQIs are designed to be used for inpatients, not for outpatients, so outpatients are not included in the report's IQI table. Second, the APR-DRGs are hierarchical, mutually exclusive groups of conditions and procedures. Each inpatient is assigned a single APR-DRG that reflects the most complex care that the inpatient received and the most hospital resources used to care for the inpatient. An inpatient may not belong to more than one APR-DRG. For example, if a gallbladder removal inpatient started with a laparoscopic gallbladder removal which became an open gallbladder removal, that inpatient would be assigned APR-DRG 262 (Cholecystectomy Except Laparoscopic), not APR-DRG 263 (Laparoscopic Cholecystectomy).

Please note that outpatients are not assigned an APR-DRG.

## Sources of Quality Indicators

In compliance with SB 132, the Senate Bill for the Health Care Consumer's Report, the Utah Health Data Committee adopts "nationally recognized standards" for its public reporting on quality and safety. The federal government's agency charged with overseeing health care quality, the Agency of Healthcare Research and Quality (AHRQ) has developed a set of Quality Indicators derived from hospital discharge data. Carolyn M. Clancy, M.D., Director of the federal Agency for Healthcare Research and Quality (AHRQ) has saluted Utah's efforts. She said, "AHRQ views public reporting as one important strategy to advance the quality improvement agenda in health care," Dr. Clancy added, "Evidence shows that publicly reporting performance by specific hospitals is a key element that promotes enhanced patient care." A document entitled "Guidance for Using the AHRQ Quality Indicators for Hospital-level Public Reporting or Payment" is available at: **http://www.qualityindicators.ahrq.gov/documentation.htm.**

### Inpatient Quality Indicators (IQIs)

These indicators were developed by the Agency for Healthcare Research and Quality (AHRQ) based on inpatient hospital discharge data. Although hospital discharge data do have some limitations, research has shown that IQIs may serve as proxies for utilization, quality, or patient outcomes. AHRQ IQI definitions and analytical methods were used to calculate the quality indicators in this report. For more detailed information, go to **www.qualityindicators.ahrq.gov/**

This report includes one of the AHRQ IQIs for gallbladder removal inpatients, a utilization indicator. Currently these Indicators cannot be used for outpatients.

The gallbladder removal report includes only actual rate for Utah overall and each hospital and the the national laparoscopic gallbladder removal percentage (the Utah overall expected rate), as the range of expected rates across hospitals is relatively narrow. Based on research in the 1990s when laparoscopic gallbladder removal was a relatively new procedure, AHRQ includes rate of laparoscopic gallbladder removal among its quality indicators, the reasoning being that higher rates indicate adoption of a new procedure that is usually less expensive and less traumatic to patients than open gallbladder removal. However, many experts currently suggest that 100% laparoscopic gallbladder removal should not be a goal for optimal health care. For some patients, laparoscopic

gallbladder removal is not possible or is too risky. Such patients require more extensive procedures, such as open gallbladder removal.

# Definitions and Codes for Each Quality Indicator

The following pages for the quality indicator used in this report are from
AHRQ Quality Indicators—Guide to Inpatient Quality Indicators: Quality of Care in Hospitals—Volume, Mortality, and Utilization. Rockville, MD: Agency for Healthcare Research and Quality, 2002, Version 3.1 (March 2007)
http://www.qualityindicators.ahrq.gov/downloads/iqi/iqi_guide_v31.pdf

AHRQ Quality Indicators, Inpatient Quality Indicators Technical Specifications, 2002, Version 3.2a (March 2008)
http://www.qualityindicators.ahrq.gov/downloads/iqi/iqi_technical_specs_v32a.pdf

## Laparoscopic Cholecystectomy Rate (IQI 23)

Surgical removal of the gallbladder (cholecystectomy) performed with a laparoscope has been identified as an underused procedure [in the 1990s]. Laparoscopic cholecystectomy is associated with less morbidity in less severe cases.

| | |
|---|---|
| Relationship to Quality | Laparoscopic cholecystectomy is a new technology with lower risks than open cholecystectomy (removal of the gallbladder). Higher rates represent better quality. |
| Benchmark | State, regional, or peer-group average. |
| Definition | Number of laparoscopic cholecystectomies per 100 cholecystectomies. |
| Numerator | Number of laparoscopic cholecystectomies (any procedure field) among cases meeting the inclusion and exclusion rules for the denominator. |
| Denominator | All discharges, age 18 years and older, with any procedure code of cholecystectomy in any procedure field.<br><br>Include only discharges with uncomplicated cases: cholecystitis or cholelithiasis in any diagnosis field.<br><br>Exclude cases:<br>• MDC 14 (pregnancy, childbirth, and puerperium)<br>• MDC 15 (newborns and other neonates) |
| Type of Indicator | Provider Level, Procedure Utilization Indicator |

## Laparoscopic Cholecystectomy Rate (IQI 23)

**Numerator:**
Number of laparoscopic cholecystectomies (any procedure field) among cases meeting the inclusion and exclusion rules for the denominator.

ICD-9-CM laparoscopic cholecystectomy procedure code: 5123 LAPAROSCOPIC CHOLE

**Denominator:**
All discharges, age 18 years and older, with cholecystectomy in any procedure field.

ICD-9-CM cholecystectomy procedure codes:
5122 CHOLECYSTECTOMY
5123 LAPAROSCOPIC CHOLE

Include:
Only discharges with uncomplicated cases: cholecystitis and/or cholelithiasis in any diagnosis field. ICD-9-CM uncomplicated cholecystitis and/or cholelithiasis diagnosis codes:
57400 CHOLELITH W AC CHOLECYS
5750 ACUTE CHOLECYSTITIS
57401 CHOLELITH/ AC GB INF-OBST
5751 CHOLECYSTITIS NEC OCT96-
57410 CHOLELITH W CHOLECYS NEC
57510 CHOLECYSTITIS NOS OCT96-
57411 CHOLELITH/GB INF NEC-OBS
57511 CHRON CHOLECYSTITIS OCT96-
57420 CHOLELITHIASIS NOS
57512 AC/CHR CHOLECYSTITIS OCT96-
57421 CHOLELITHIAS NOS W OBSTR

Exclude cases:
• MDC 14 (pregnancy, childbirth, and puerperium)
• MDC 15 (newborns and other neonates)

END IQI 23

# AHRQ Rates for Quality Indicators

The The Agency for Healthcare Research and Quality (AHRQ) Quality Indicators Software outputs several rates. The AHRQ Quality Indicators e-Newsletter, June 2005, provided guidance to users for appropriate rates to use for specific purposes.

### QI Tips: Using Different Types of QI Rates

Which rate should you use, the observed (actual), expected, risk adjusted, and/or smoothed rates?

Here are some guidelines.

If the user's primary interest is to identify cases for the health care provider's internal follow-up and quality improvement, then the **observed** (actual) **rate** would help to identify them. *The observed rate is the raw rate generated by the QI software from the data the user provided.* Areas for improvement can be identified by the magnitude of the observed rate compared to available benchmarks and/or by the number of patients impacted.

Additional breakdowns by the default patient characteristics used in stratified rates (e.g., age, gender, or payer) can further identify the target population. Target populations can also be identified by user-defined patient characteristics supplemented to the case/discharge level flags. Trend data can be used to measure change in the rate over time.

Another approach to identify areas to focus on is to compare the observed and **expected rates**. *The expected rate is the rate the provider would have if it performed the same as the reference population given the provider's actual case-mix (e.g., age, gender, APR-DRG and comorbidity categories).*

If the observed death rate is higher than the expected rate (i.e., the ratio of observed/expected is greater than 1.0, or observed minus expected is positive), then the implication is that the provider had more deaths than the reference population for that particular indicator. Users may want to focus on these indicators for quality improvement.

If the observed death rate is lower than the expected rate (i.e., the ratio of observed/expected is less than 1.0, or observed minus expected is negative), then the implication is that the provider had fewer deaths than the reference population. Users may want to focus on these indicators for identifying best practices.

If the observed use rate is higher than the expected rate, then the implication is that the provider had more patients with the specified procedure than the reference population for that particular indicator. If the observed use rate is lower than the expected rate, then the implication is that the provider had fewer patients with the specified procedure than the reference population for that particular indicator.

Users can also compare the expected rate to the **population rate** reported in the detailed evidence section of the IQI, PQI, or PSI Guide to determine how their case-mix compares to the reference population. If the population rate is higher than the expected rate, then the provider's case-mix is less severe than the reference population. If the population rate is lower than the expected rate, then the provider's case-mix is more severe than the reference population.

AHRQ uses this difference between the population rate and the expected rate to "adjust" the observed rate to account for the difference between the case-mix of the reference population and the provider's case-mix. This is the provider's **risk-adjusted rate**.

If the provider has a less severe case-mix, then the adjustment is positive (population rate > expected rate) and the risk-adjusted rate is higher than the observed rate. If the provider has a more severe case-mix, then the adjustment is negative (population rate < expected rate) and the risk-adjusted rate is lower than the observed rate. *The risk-adjusted rate is the rate the provider would have if it had the same case-mix as the reference population given the provider's actual performance.*

Finally, users can compare the risk-adjusted rate to the **smoothed** or "reliability-adjusted" rate to determine whether this difference between the risk-adjusted rate and reference population rate is likely to remain in the next measurement period. *Smoothed rates are weighted averages of the population rate and the risk-adjusted rate, where the weight reflects the reliability of the provider's risk-adjusted rate.*

A ratio of (smoothed rate - population rate) / (risk-adjusted rate - population rate) greater than 0.80 suggests that the difference is likely to persist (whether the difference is positive or negative). A ratio of less than 0.80 suggests that the difference may be due in part to random differences in patient characteristics (patient characteristics that are not observed and controlled for in the risk-adjustment model). In general, users may want to focus on areas where the differences are more likely to persist.

From http://qualityindicators.ahrq.gov/newsletter/2005-June-AHRQ-QI-Newsletter.htm#Headline3 (Accessed on July 16, 2008).

### Expected Use Rate

Expected utilization (use) percentage is the number of cases expected per 100 patients that had a certain procedure if the hospital performed the same as other hospitals in the nation with similar patients. Expected use percentage adjusts for the hospital's case mix (patients' age, gender and how ill the patients are). For example, the expected use percentage for laparoscopic gallbladder removals is the number of inpatients expected to have this laparoscopic procedure per 100 inpatients that have either laparoscopic or open gallbladder removal in that hospital if it performed like similar hospitals in the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases for 2005, the most recent, available national data. For more information on the AHRQ Inpatient Quality Indicators, see www.qualityindicators.ahrq.gov/downloads/iqi/iqi_guide_v31.pdf.

# Limitations of Quality Indicators

Many factors affect a hospital's performance on quality measures. Such factors include the hospital's size, the number of cases with a specified condition or procedure, available specialists, teaching status and especially how ill the hospital's inpatients are. Hospitals that treat high-risk (very ill) patients may have higher percentages of deaths and higher charges than hospitals that transfer these patients. Hospitals that treat patients with do not resuscitate (DNR) orders or other terminally ill patients receiving palliative care (comfort care) may have higher percentages of deaths. Hospitals may report patient diagnosis codes differently which could impact the comparison of quality measurement among hospitals. The quality indicators adjust for how ill each hospital's inpatients are, but the adjustment may not capture the full complexity of the patient's condition. The Utah Hospital Discharge Database includes up to nine diagnoses and up to six procedures for each patient. Some patients have additional diagnoses and procedures that are not included in this database. As a result, the measures of patient illness may not be complete. Outpatients usually are less ill and have a less complex medical history than inpatients and require simple, straightforward procedures and stays in the hospital of less than 24 hours. See Glossary for more about specific gallbladder removal procedures.

# Method of Reporting Charges

### Use of All-patient Refined-Diagnosis Related Group (APR-DRG)

The APR-DRG classification system is used in the Utah health care consumer's reports to categorize discharge records into different diseases/conditions groups of patients.

- **Diagnosis Related Group (DRG)**

The DRGs were developed for the Health Care Financing Administration as a patient classification scheme which provides a means of relating the type of patients a hospital treats (i.e., its case mix) to the costs incurred by the hospital. While all patients are unique, groups of patients have common demographic, diagnostic and therapeutic attributes that determine their resource needs. All patient classification schemes capitalize on these commonalities and utilize the same principle of grouping patients by common characteristics.

The use of DRGs as the basic unit of payment for Medicare patients represents a recognition of the fundamental role a hospital's "sicker" patients play in determining resource usage and costs, at least on average. "The DRGs, as they are now defined, form a manageable, clinically coherent set of patient classes that relate a hospital's case mix to the resource demands and associated costs experienced by the hospital." (*Diagnosis Related Groups, Seventh Rev., Definitions Manual*, page 15.)

Each discharge in the Utah Health Discharge Database was assigned into a DRG based on the principal diagnosis, secondary diagnoses, surgical procedures, age, sex, and discharge status of the patient.

### ❑ APR-DRG and Patient Severity Level

APR-DRG stands for All Patient Refined Diagnosis Related Group, software widely used in health services research. The APR-DRG software organizes about 20,000 clinical diagnoses and procedures into about 300 hierarchical, mutually exclusive groups. As stated previously, each inpatient is assigned a single APR-DRG that reflects the most complex care that the inpatient received and the most hospital resources used to care for the inpatient. An inpatient may not belong to more than one APR-DRG. For example, if a gallbladder removal inpatient started with a laparoscopic gallbladder removal which became an open gallbladder removal, that inpatient would be assigned APR-DRG 262 (Cholecystectomy Except Laparoscopic), not APR-DRG 263 (Laparoscopic Cholecystectomy). Note that outpatients are not assigned an APR-DRG.

Each APR-DRG has four levels for severity of illness. The severity of illness and risk of mortality subclasses have levels of 1 to 4, indicating minor, moderate, major, and extreme, respectively. In the consumer reports, patients are assigned to one of two groups. Patients with a minor or moderate level of severity of illness are in the Minor/Moderate group, and patients who are assigned a major or extreme level of severity of illness are in the Major/Extreme group. Patients whose care is classified in the Major/Extreme group are those who have multiple conditions, diseases, or illnesses or patients who are much sicker than other patients having the same procedure that are classified in the Minor/Moderate group. This report uses APR-DRG version 20.0 for expected deaths, because AHRQ uses this version for risk adjustment in the Inpatient Quality Indicators. This report also uses APR-DRG version 20.0 for average charges.

Note that other Health Data Committee reports, such as the Utah Inpatient Hospital Utilization and Charges Profile, Hospital Detail report for 2004 and previous years, use APR-DRG Version 15.0.

## Excluding Outlier Cases from Calculating Hospital Average Charges

Some patients have exceptionally low or high lengths of stay or total facility (hospital) charges. A hospital's charges can be affected by just a few unusually long (or short) or expensive (or inexpensive) cases. These high or low values could be a result of coding or data submittal errors, particularly in length of stay, total charges, or data elements that affect APR-DRG assignments. Other reasons for exceptionally low charges could be due to death or transfer to another facility. Exceptionally high charges could be due to a catastrophic condition. Whatever the reason, these values, referred to as "outliers," distort the averages and were excluded from calculations. Following the "industry standards" and research conventions in statistics, high charge outliers (facility) are defined in this report, as well as those preceding and succeeding it, as values above 2.5 standard deviations from the state mean for each of the four levels of severity of illness for each APR-DRG. Means and standard deviations are APR-DRG specific and calculated on a

statewide basis for a specific calendar year. For this report, the high outlier cases for both charge and length of stay are excluded from calculation of hospital inpatient average charges.

High outlier cases are not excluded from outpatient average charges.

### Facility Charges are Used for Inpatients in Consumer's Reports

The Utah Hospital Discharge Database contains two types of charge summary information:

(1) Total Charges - Sum of all charges included in the billing form, including facility charges and professional fees and patient convenience items. This is different from *payment* received by the hospital or *cost* of treatment. Cost of treatment can include additional care after the patient leaves the hospital.
(2) Facility Charges - Sum of all charges related to using a facility. Facility charges are calculated by subtracting professional fees and patient convenience item charges from total charge.

Payment received by the hospital may be less than the total charges billed for the patient's hospital stay due to contractual agreements with the insurance plans and/or charity/hardship programs available.

## Average Charge:

Average charge is the calculated average for all the services for which patients in a particular severity of illness group (one of two groups in this report, minor/moderate or major/extreme) were billed as the facility charges at a particular hospital for a given condition or procedure. The average was calculated by adding the facility charges for all the services billed at that hospital for a given condition or procedure and then dividing by the total number of patients in this severity of illness group for that condition or procedure.

The method of calculating the average facility charge is identical to the method used in the HDC's standard report: Utah Hospital Utilization and Charge Profile, Hospital Details, Table ST 1-3. In other words, both publications report average facility charges at APR-DRG and patient level of severity of illness (one of four levels for each APR-DRG) without high outliers.

The method of calculating the average total charge is the same, except that it includes charges in addition to the facility charges, such as the surgeon's and the anesthesiologist's fees.

Charge tables for inpatients report average facility charges. Charge tables for outpatients report average total charges.

### Average Length of Stay:

The average length of stay was the sum of days all inpatients stayed in the hospital for a certain condition or procedure divided by the total number of inpatients who were treated for that condition or procedure. For example, the average length of stay for open gallbladder removal inpatients with a moderate level of severity of illness at Hospital A would be the sum of the days of stay for this hospital's open gallbladder removal inpatients with a moderate level of severity of illness divided by the sum of Hospital A's open gallbladder removal inpatients with a moderate level of severity of illness.

The method of calculating the average length of stay is the identical method used in the HDC's standard report: Utah Hospital Utilization and Charge Profile, Hospital Details (ST-1) Table ST 1-3. The average facility length of stay excludes high outliers by APRDRG and patient severity level. In other words, outlier charges and length of stay are excluded for each of the four levels of patient severity of illness for each APR-DRG.

## Limitations of Charge Indicators

The average charge shown in this report differs from "costs," "reimbursement," "price" and "payment." Many factors will affect the cost for your hospital stay, including whether you have health insurance, the type of insurance and the billing procedures at the hospital. This report excludes outlier (unusually high) charge cases and length of stay cases from the calculation of average charge for inpatients but not for outpatients (see Glossary).

This report shows total billed facility charges for inpatients and total billed charges for outpatients. Facility charges may not include additional charges, such as the surgeon's and anesthesiologist's fees. Billed charges are to be used as only one indicator of hospital performance. All patients, or insurance plans, do not pay the same amount for similar treatments, supplies, services, and procedures, even though they may be billed the same amount. Different payers have varied arrangements with each hospital for payment. Hospitals offer a variety of contracts, many with discount arrangements based on volume. Because of this, the data reflect pre-contractual prices for hospitalization and not the actual payment between providers and payers. Each patient may have additional charges from physicians, such as the surgeon and the anesthesiologist.

This report can be used to compare broad measures of utilization for all hospitals, but more detailed data are needed to look at specific performance comparisons between hospitals. This information serves as an important first step toward consumers' taking a more active role in health care decision-making.

The price of hospital services, while important, is not the only consideration in making inpatient hospital decisions. Other factors that may influence hospital services, including: the type of condition treated, the physicians who practice at the hospital, and the insurance company's managed care policies. The health plan subscriber should be familiar with his or her health plan long before hospital care is needed. For additional

information on managed care performance, please contact the Office of Health Care Statistics at (801) 538-7048.

# Kinds of Gallbladder Removals

This report includes some but not all kinds of gallbladder removal among adult hospital inpatients (age 18 years and older).

### Rate of Laparoscopic Gallbladder Removal

The report's quality indicator, AHRQ IQI 23 Laparoscopic Cholecystectomy, includes ICD-9-CM procedure code 51.23 (laparoscopic gallbladder removal) and ICD-9-CM procedure code 51.22 (gallbladder removal or open gallbladder removal) on inpatients with uncomplicated cholecystitis (inflammation of the gallbladder) and/or cholelithiasis (gallstones) (see Definitions and Codes for Each Indicator in this document). The actual percentage is the number of laparoscopic gallbladder removals divided by the number of laparoscopic and open gallbladder removals. Gallbladder removals that begin as laparoscopic and finish as open surgery are considered to be open gallbladder removals.

### Average Hospital Charge

The average hospital charge in this report is for inpatients in the All Patient Refined Diagnosis Related Group 263 (APR-DRG 263) Laparoscopic Cholecystectomy (ICD-9-CM procedure code 51.23) and APR-DRG 262 Cholecystectomy Except Laparoscopic (or ICD-9-CM procedure code 51.22), which this report calls open gallbladder removal). Gallbladder removals that began as laparoscopic and became open surgeries are considered to be open gallbladder removals.

Because outpatients do not have APR-DRGs, outpatients do not have levels of severity of illness. This report included only outpatients with ICD-9-CM procedure code 51.23. A small number of outpatients had code 51.22 (95 discharges, compared to 5,923 discharges with the laparoscopic code). These discharges have been excluded from the analyses in this report.